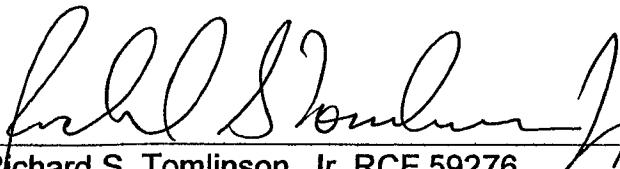




**HYDROLOGY STUDY  
FOR  
2249 Montecito Drive**

April 12, 2006

  
Richard S. Tomlinson, Jr. RCE 59276

4/12-06  
Date

**9755 Clairemont Mesa Boulevard, Suite 100  
San Diego, CA 92124  
(858) 614-5000**

**RECEIVED**  
JAN 02 2007

**DEPARTMENT OF PLANNING  
AND LAND USE**

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## ATTACHMENTS

- Hydraulic Calculation
- Existing Condition hydrology calculations
- Proposed Condition hydrology calculations
- Hydrologic Exhibit

## **PROJECT DESCRIPTION**

This project is located in the Ramona area of the County of San Diego. The purpose of this hydrology study is to analyze the effects of future grading that would occur from the proposed lot split for APN 281-540-19.

### **Existing Conditions**

The subject lot is located in a 200-acre watershed near the Ramona Airport. The watershed is made up of rural-residential lots consisting of mostly natural terrain. Per the County of San Diego Hydrology manual, an assumed C-value for the watershed is 0.45 for a rural-residential lots was used. The lot is located outside of the 100-year flood inundation zone per Flood Insurance Rate Panel 06073C117 F.

The existing site consists of an existing home site on the westerly portion of the lot and a barn and out building on the easterly portion of the lot. A driveway serving the existing residence runs along the westerly boundary of the site.

Flows from off site enter the site from the east. These flows represent the majority of the flows that concentrate on site. Flows traverse the site in a southerly direction and then exit the site at Montecito Road. The existing culvert at Montecito Road is undersized, therefore flows from a large event travel across the roadway through the traveled way.

### **Proposed Conditions**

The proposed future grading to occur within the subject lot would provide a common driveway and a building pad for the new lot. Impervious area added to the watershed would be in the form of an asphalt driveway providing access to the existing residence and the proposed residence. The existing barn and out buildings that are located on the proposed building pad are to be demolished. In addition, a portion of the existing driveway serving the existing residence is also to be demolished. Therefore, the total increase in impervious area is minimal.

The total amount of impervious area will increase from 0.33 acres to approximately 0.66 acres. Because of the proposed demolition, the total impervious area is not significantly changing from the existing condition.

Total runoff for the existing condition is 477.9 cfs for the 100-year storm. The runoff in the proposed condition is also 483.8 cfs for the 100 year storm (see table below). The increase in runoff from the existing to the proposed condition is approximately 6 cfs.

Runoff Comparison				
Basin	Area	C' Value	Intensity	Q100
Existing	200	0.45	5.31	<b>477.9</b>
Prop. A	197	0.45	5.31	<b>470.8</b>
Prop. B	3.1	0.45	9.22	<b>13.0</b>
				<b>483.8</b>

Three 24" CMP pipes are proposed for the driveway crossing. Because a portion of the lot is subject to 100-year inundation, these pipes are for low flow conditions only. For the high flow conditions, a dip section per the County of San Diego design stand DS-14 has been proposed. Calculations for the three 24" pipes and the dip section have been included in appendix A of this report.

Total impervious area is increasing on site from approximately 0.33 acre to 0.66 acre. The increase in impermeable area combined with the splitting of the onsite basin from 1 basin to 2 basins and the corresponding decrease in time of concentration is the reason for the increase in runoff. Because the increase in runoff is minimal, no downstream impacts are anticipated.

## **METHODOLOGY**

Runoff values and time of concentration were calculated by hand using the County of San Diego Intensity-Duration Design Chart.

### **Drainage Criteria**

Design Storm:	100-year
Runoff Coefficients:	"C" values based on the San Diego County Hydrology Manual.
Rainfall Intensity:	Based on criteria presented by the County of San Diego design standards for natural terrain.

## **RESULTS**

The results of the hydrologic analysis show that the possible future grading will not affect the existing watershed. The amount of impervious area added to the watershed is minimal (less than 0.2%) and will not increase the overall hydrologic conditions. The hydrologic calculations show minimal increase in runoff for the watershed affected.

The attached hydrologic exhibits show the watershed in relation to the project site and the 100-year flood inundation zone.

## **CONCLUSION**

Because the time of concentration for Basin A-2 is shorter than the time of concentration for Basin A-1, flows from Basin A-1 will be past the peak flows at the time the Basin A-1 is peaking. It is not anticipated that the downstream condition will be significantly changed from the existing to proposed condition.

## **Appendix A**

### **Hydraulic Calculations**

# GIFFIN PROPERTY

## DIP SECTION

### PIPES

3-24" PIPES @ 1%

Assume Full depth

Max 3' Depth of Water

$Q_{max} = 55 \text{ cfs per pipe}$

$Q_{max \text{ total}} = 155 \text{ cfs}$

### Overflow

$Q_{total} = 314 \text{ cfs} \quad (10-\text{YEAR})$

LESS PIPE FLOW

$314 \text{ cfs} - 155 \text{ cfs}$   
 $159 \frac{1}{2} \text{ cfs}$

Depth Max = 10"

assume 10% GRADE  
IN AND OUT.

for 20' Dip Section

$$V = 7.93$$

$$D = 0.73$$

$$V * D = 5.8 \quad OK \checkmark$$

Untitled  
TRAPEZOIDAL CHANNEL ANALYSIS  
NORMAL DEPTH COMPUTATION

April 12, 2006

PROGRAM INPUT DATA	
DESCRIPTION	VALUE
Flow Rate (cfs).....	159.0
Channel Bottom Slope (ft/ft).....	0.01
Manning's Roughness Coefficient (n-value).....	0.013
Channel Left Side Slope (horizontal/vertical).....	10.0
Channel Right Side Slope (horizontal/vertical).....	10.0
Channel Bottom width (ft).....	20.0

COMPUTATION RESULTS	
DESCRIPTION	VALUE
Normal Depth (ft).....	0.73
Flow Velocity (fps).....	7.93
Froude Number.....	1.837
Velocity Head (ft).....	0.98
Energy Head (ft).....	1.71
Cross-Sectional Area of Flow (sq ft).....	20.06
Top Width of Flow (ft).....	34.68

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Phone:(281)440-3787, Fax:(281)440-4742, Email:software@dodson-hydro.com  
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**Untitled**  
**PIPE CULVERT ANALYSIS**  
**COMPUTATION OF CULVERT PERFORMANCE CURVE**

April 12, 2006

**PROGRAM INPUT DATA**

<b>DESCRIPTION</b>	<b>VALUE</b>
Culvert Diameter (ft).....	3.0
FHWA Chart Number.....	1
FHWA Scale Number (Type of Culvert Entrance).....	2
Manning's Roughness Coefficient (n-value).....	0.013
Entrance Loss Coefficient of Culvert Opening.....	0.5
Culvert Length (ft).....	30.0
Invert Elevation at Downstream end of Culvert (ft).....	10.0
Invert Elevation at Upstream end of Culvert (ft).....	10.3
Culvert Slope (ft/ft).....	0.01
Starting Flow Rate (cfs).....	5.0
Incremental Flow Rate (cfs).....	5.0
Ending Flow Rate (cfs).....	55.0
Starting Tailwater Depth (ft).....	0.0
Incremental Tailwater Depth (ft).....	1.0
Ending Tailwater Depth (ft).....	10.0

**COMPUTATION RESULTS**

Flow Rate (cfs)	Tailwater Depth (ft)	Headwater Inlet Control	Headwater Outlet Control	Normal Depth (ft)	Critical Depth (ft)	Depth at Outlet (ft)	Outlet Velocity (fps)
5.0	0.0	0.94	0.0	0.56	0.7	0.56	5.54
10.0	1.0	1.37	0.0	0.79	1.0	0.79	6.78
15.0	2.0	1.72	1.98	0.97	1.24	2.0	3.0
20.0	3.0	2.04	2.91	1.13	1.44	3.0	2.83
25.0	4.0	2.34	4.03	1.27	1.61	3.0	3.54
30.0	5.0	2.64	5.18	1.41	1.77	3.0	4.24
35.0	6.0	2.93	6.35	1.54	1.92	3.0	4.95
40.0	7.0	3.22	7.55	1.67	2.06	3.0	5.66
45.0	8.0	3.53	8.78	1.8	2.19	3.0	6.37
50.0	9.0	3.67	10.03	1.94	2.3	3.0	7.07
55.0	10.0	3.97	11.32	2.08	2.41	3.0	7.78

=====

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## Appendix B

# Hydrological Calculations

# Basin

---

## Time of Concentration Calculations

Natural Watersheds  
 Length = 3300 ft.  
 $\Delta E$ lev. = 200 ft.  
 $T_c$  = 11.76 min.  
 \* Minimum  $T_c$  = 5 Minutes

$$T_c = \left( \frac{11.9L^3}{\Delta E} \right)^{0.385}$$

## Basin Intensity Calculations

Selected Frequency, 10 year

$$P_6 = \frac{2.3}{P_{24}} \text{ in.}$$

$$P_{24} = \frac{3.75}{P_6} \text{ in.}$$

$$P_6 / P_{24} = 61\%$$

$$\text{Adjusted } P_6 = \frac{2.30}{P_6} \text{ in.}$$

$$T_c(D) = \frac{11.76}{I} \text{ min.}$$

$$I = \frac{3.49}{P_6} \text{ in/hr}$$

$$I = 7.44 P_6 D^{-0.645}$$

## Basin Flow Calculations

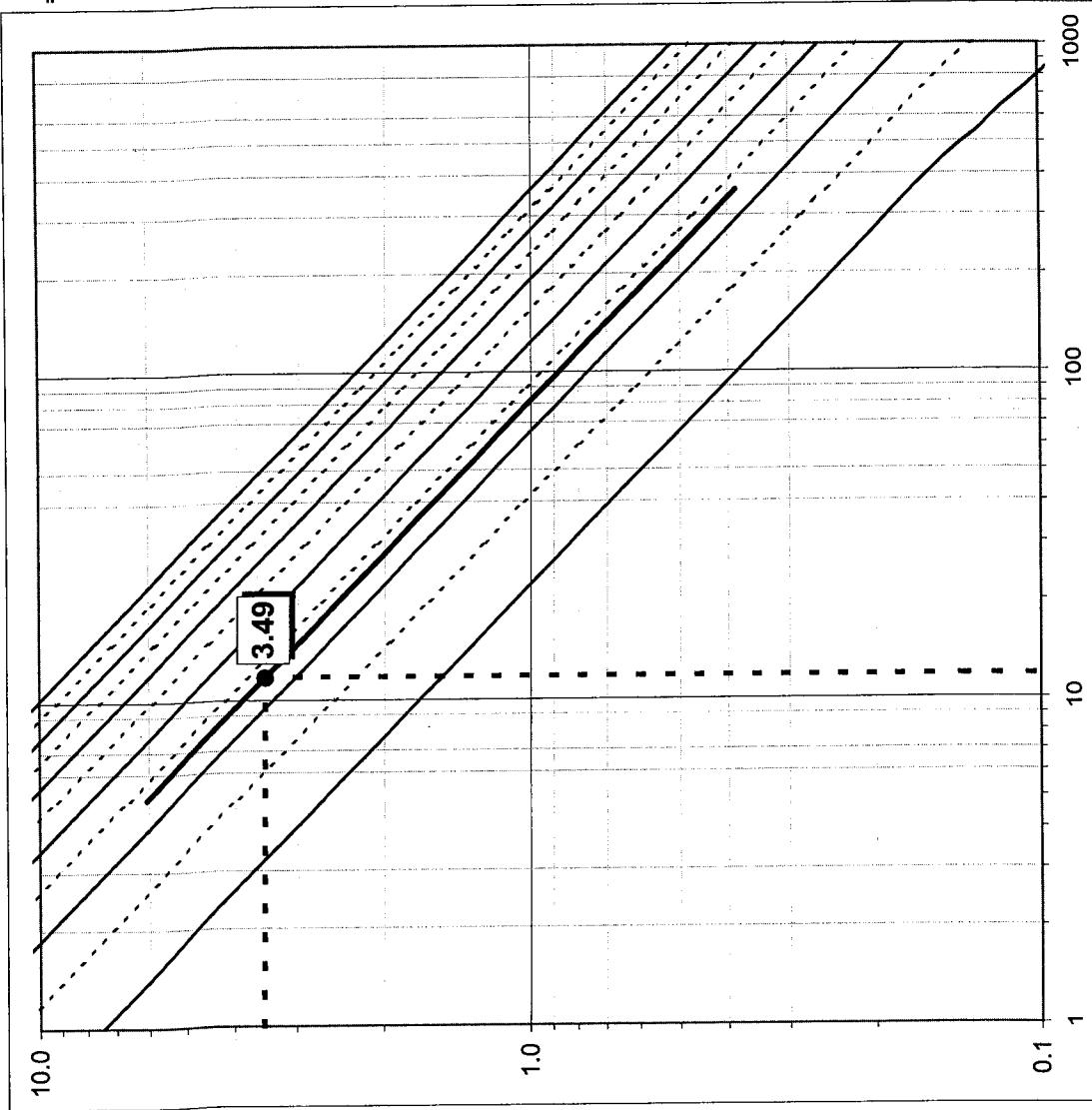
$$Q = C * I * A$$

$$Q = \frac{314.1}{C} \text{ cfs}$$

$$C = \frac{0.45}{I}$$

$$I = \frac{3.49}{A}$$

$$A = \frac{200.0}{\text{ac.}}$$



**Basin****Time of Concentration Calculations****Natural Watersheds**

$$T_c = \left( \frac{11.9L^3}{\Delta E} \right)^{0.385}$$

Length = 3300 ft.  
 $\Delta E$  elev. = 200 ft.  
 $T_c$  = 11.76 min.  
 \* Minimum  $T_c$  = 5 Minutes

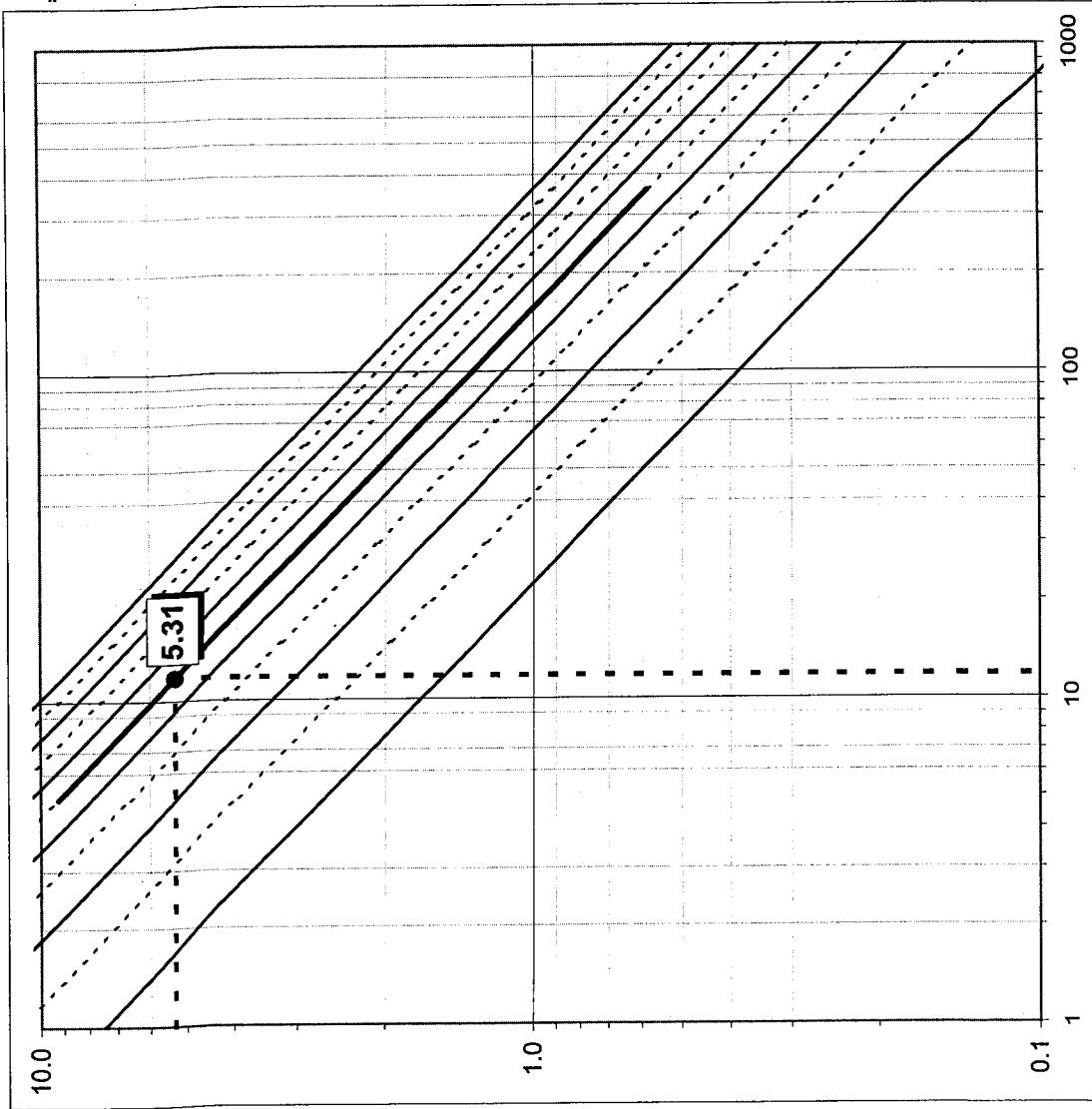
**Basin Intensity Calculations**Selected Frequency, 100 year

$$\begin{aligned} P_6 &= \frac{3.5}{P_6} \text{ in.} & P_6 \text{ must be within} \\ P_{24} &= \frac{6}{P_{24}} \text{ in.} & 45\% \text{ to } 65\% \text{ of } P_{24}. \\ P_6 / P_{24} &= \frac{58\%}{3.50} \text{ in.} & \text{Adjust } P_6 \text{ as needed.} \\ \text{Adjusted } P_6 &= \frac{3.50}{5.31} \text{ in.} \\ T_c(D) &= \frac{11.76}{5.31} \text{ min.} \\ I &= \frac{7.44 P_6 D^{-0.645}}{5.31} \text{ in/hr} \end{aligned}$$

**Basin Flow Calculations**

$$Q = C * I * A$$

$$\begin{aligned} Q &= \frac{477.9}{C} \text{ cfs} \\ C &= \frac{0.45}{0.45} \\ I &= \frac{5.31}{5.31} \text{ in/hr} \\ A &= \frac{200.0}{200.0} \text{ ac.} \end{aligned}$$



# Basin A-1

## Time of Concentration Calculations

Natural Watershed  
 $\text{Length} = \frac{3300 \text{ ft.}}{\Delta \text{Elev.} = 200 \text{ ft.}}$   
 $T_c = 11.76 \text{ min.}$   
 \* Minimum  $T_c = 5 \text{ Minutes}$

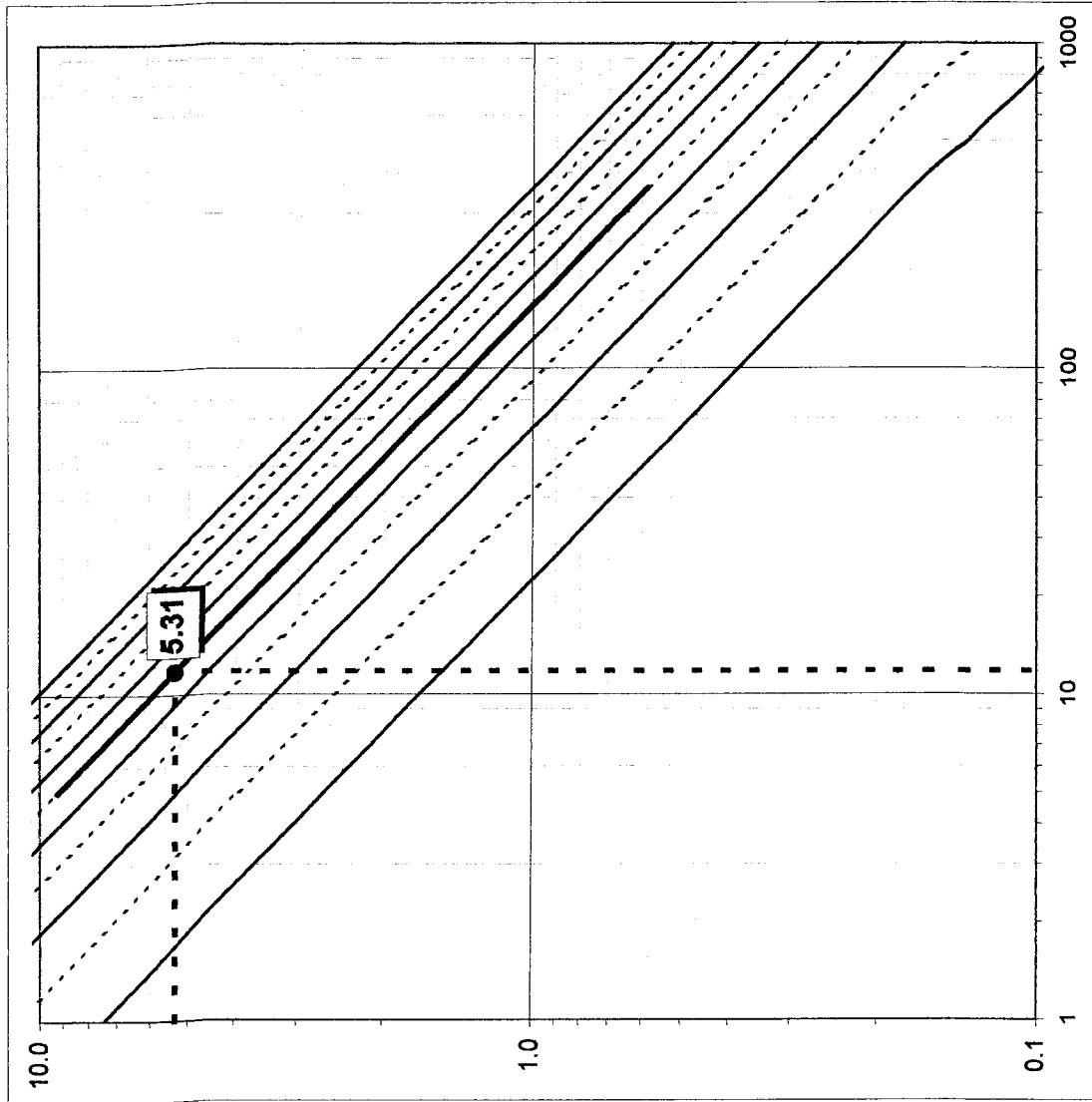
$$T_c = \left( \frac{11.9L^3}{\Delta E} \right)^{0.35}$$

Basin Intensity Calculations  
 Selected Frequency,  $\frac{100}{P_6} \text{ year}$   
 $P_6 = \frac{3.5}{\text{in.}}$   
 $P_{24} = \frac{6}{\text{in.}}$   
 $P_6 / P_{24} = \frac{58\%}{}$   
 Adjusted  $P_6 = \frac{3.50}{\text{in.}}$   
 $T_c(D) = \frac{11.76}{I = 5.31} \text{ min.}$   
 $I = 7.44 P_6 D^{-0.645}$

$$T_c = \left( \frac{11.9L^3}{\Delta E} \right)^{0.35}$$

Basin Flow Calculations  
 $Q = \frac{470.8}{C = 0.45} \text{ cfs}$   
 $I = \frac{5.31}{A = 197.0} \text{ in/hr ac.}$

$$Q = C * I * A$$



**Basin A-2****Time of Concentration Calculations**

*Natural Watersheds*

Length =	691 ft.
$\Delta E$ lev. =	17 ft.
$T_c$ =	5.00 min.

\* Minimum  $T_c$  = 5 Minutes

$$T_c = \left( \frac{11.9L^3}{\Delta E} \right)^{0.385}$$

**Basin Intensity Calculations**

Selected Frequency, 100 year

$P_6 = \frac{3.5}{P_6}$  in.  
 $P_{24} = \frac{6}{P_{24}}$  in.  
 $P_6 / P_{24} = \frac{58\%}{P_6}$  in.

Adjusted  $P_6 = \frac{3.50}{P_6}$  in.

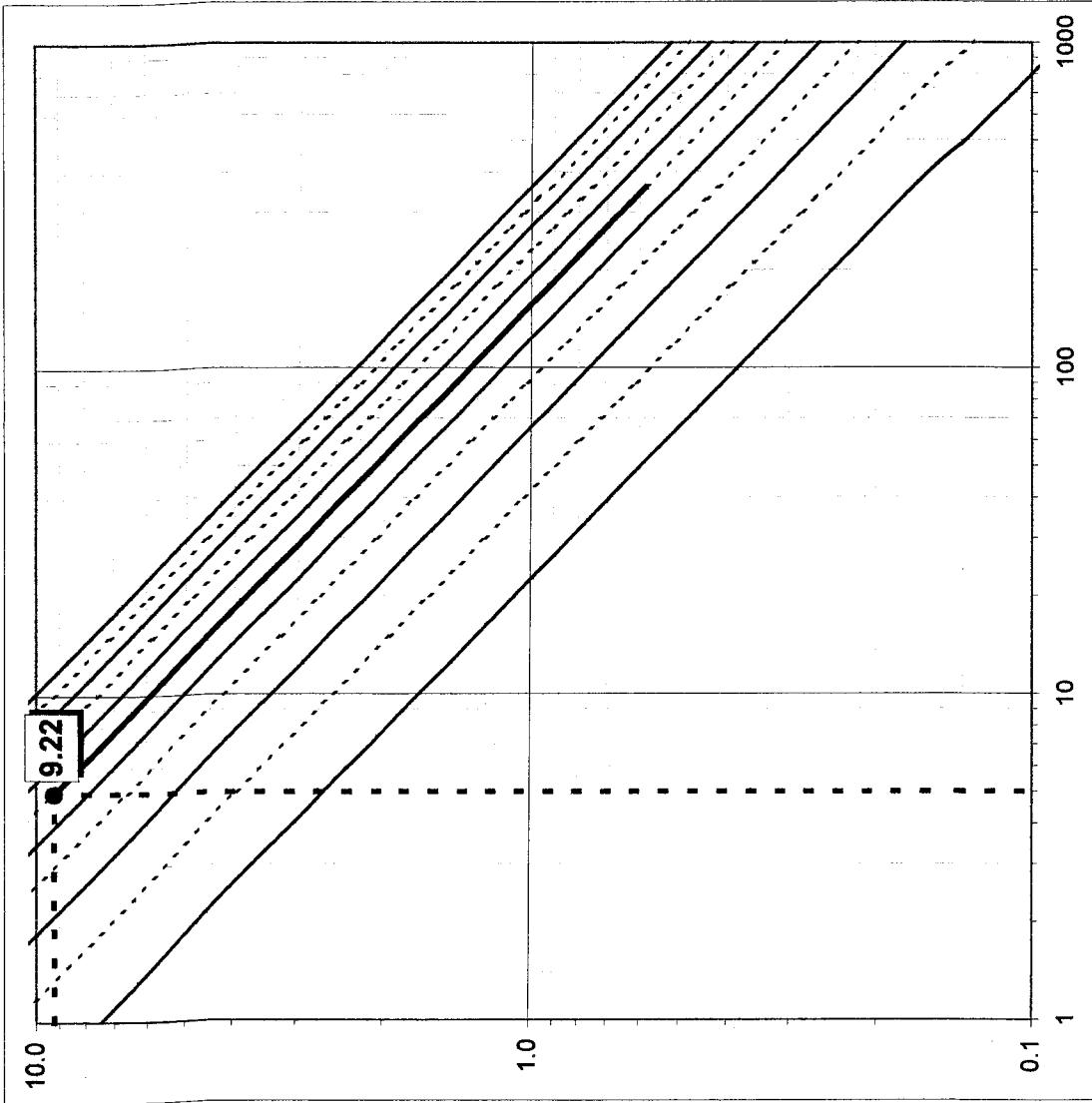
$T_c(D) = \frac{5.00}{T_c(D)}$  min.  
 $I = \frac{9.22}{I}$  in/hr

$$I = 7.44 P_6 D^{-0.645}$$

**Basin Flow Calculations**

$$Q = C * I * A$$

$$\begin{aligned} Q &= \frac{13.0}{C} \text{ cfs} \\ C &= \frac{0.45}{I} \\ I &= \frac{9.22}{A} \text{ in/hr} \\ A &= \frac{3.1}{A} \text{ ac.} \end{aligned}$$



# County of San Diego Hydrology Manual



## Rainfall Isophivials

**10 Year Rainfall Event - 6 Hours**



**2.3 in**

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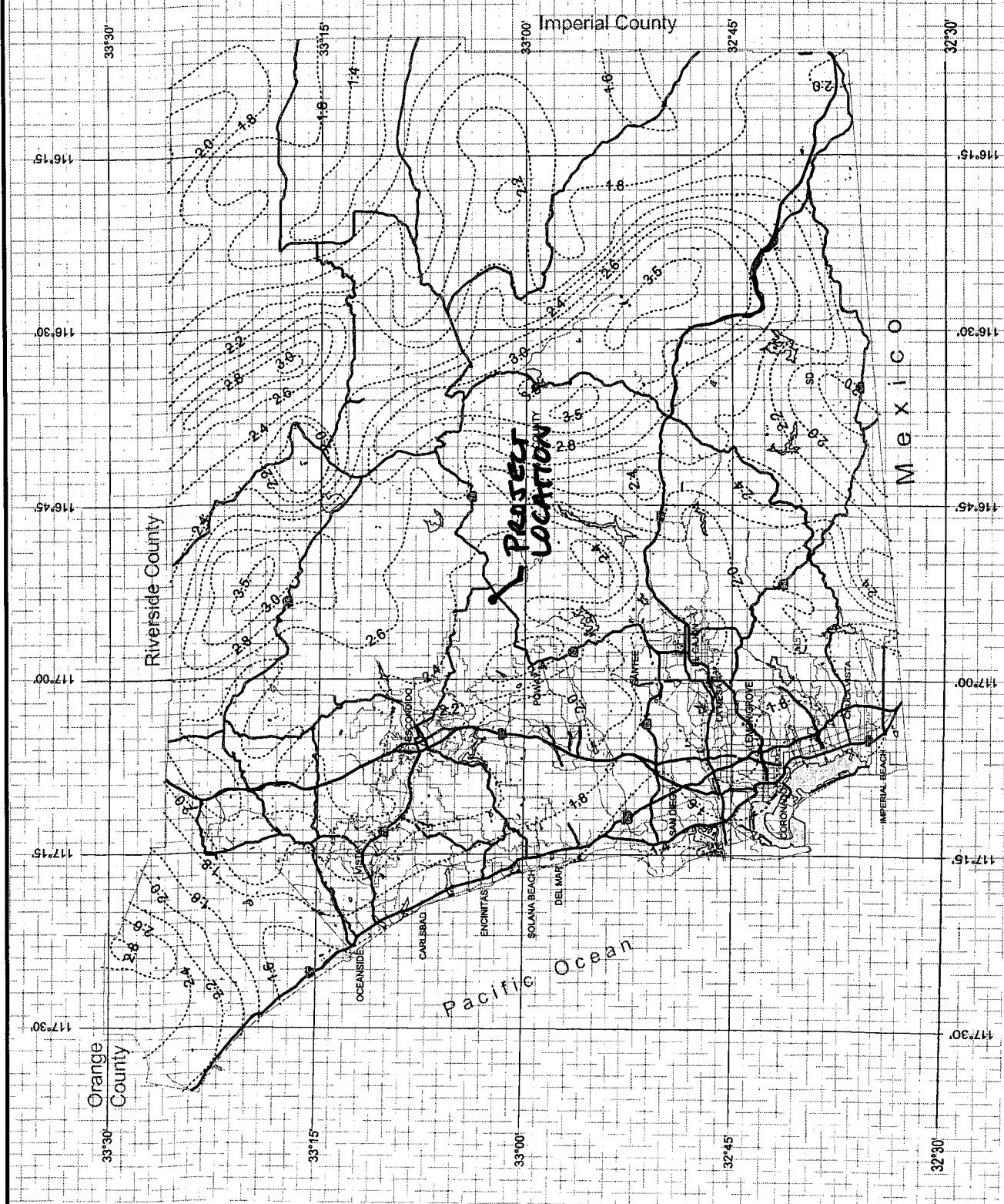
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N  
S  
W  
E

3 Miles  
0



# County of San Diego Hydrology Manual



## Rainfall Isopluvials

10 Year Rainfall Event - 24 Hours



**3.75 in**



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**SanGIS**  
Department of Public Works  
City of San Diego, California  
Computerized Surface Data System

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3 Miles

3 Miles

116°30'

116°45'

116°45'

116°30'

116°45'

116°30'

116°45'

116°30'

116°45'

116°30'

116°45'

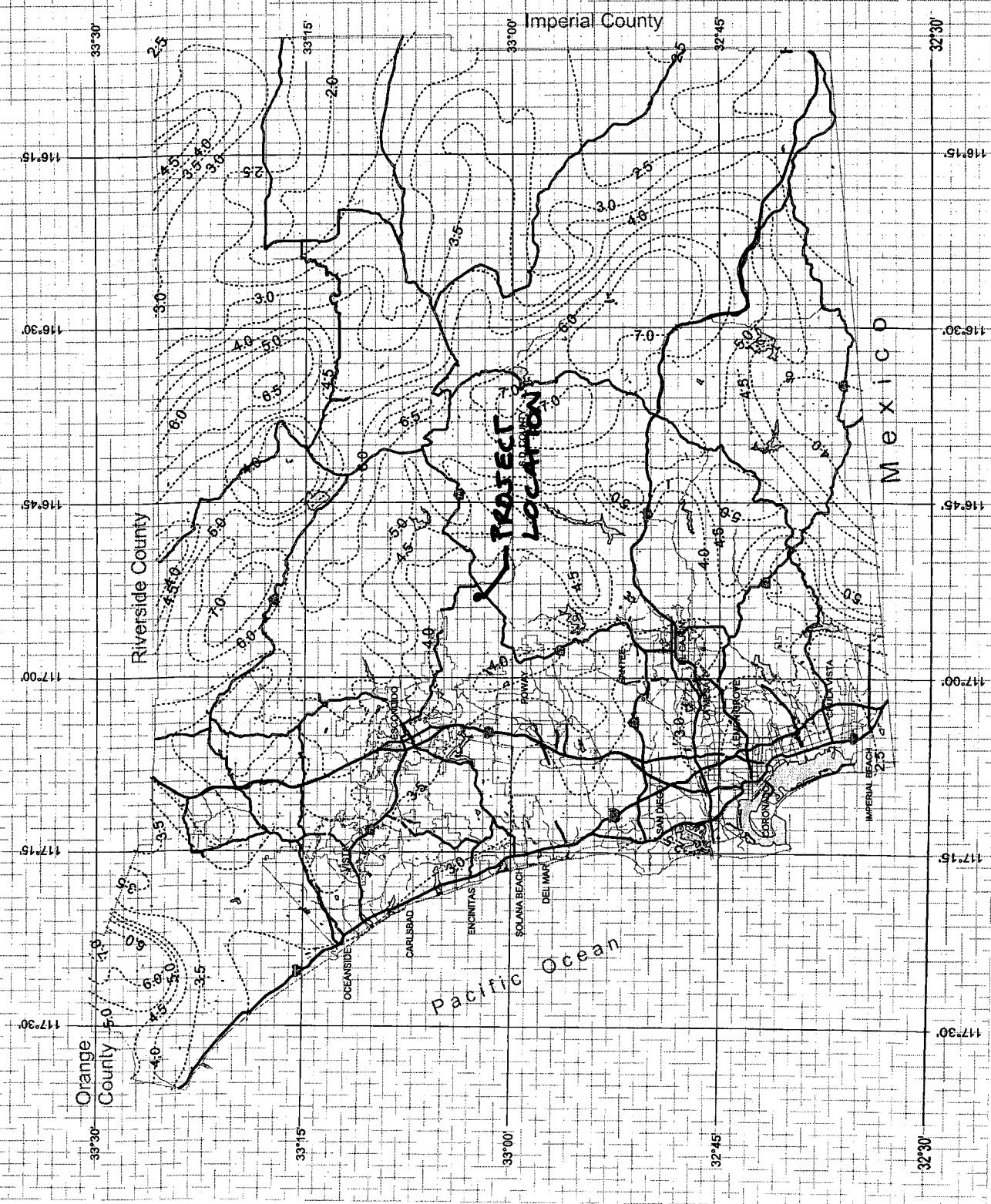
116°30'

116°45'

116°30'

116°45'

3 Miles



# County of San Diego Hydrology Manual



Rainfall Isophenials

100 Year Rainfall Event - 24 Hours



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SanGIS

Department of Public Works

Geographic Information Systems

City of San Diego, California

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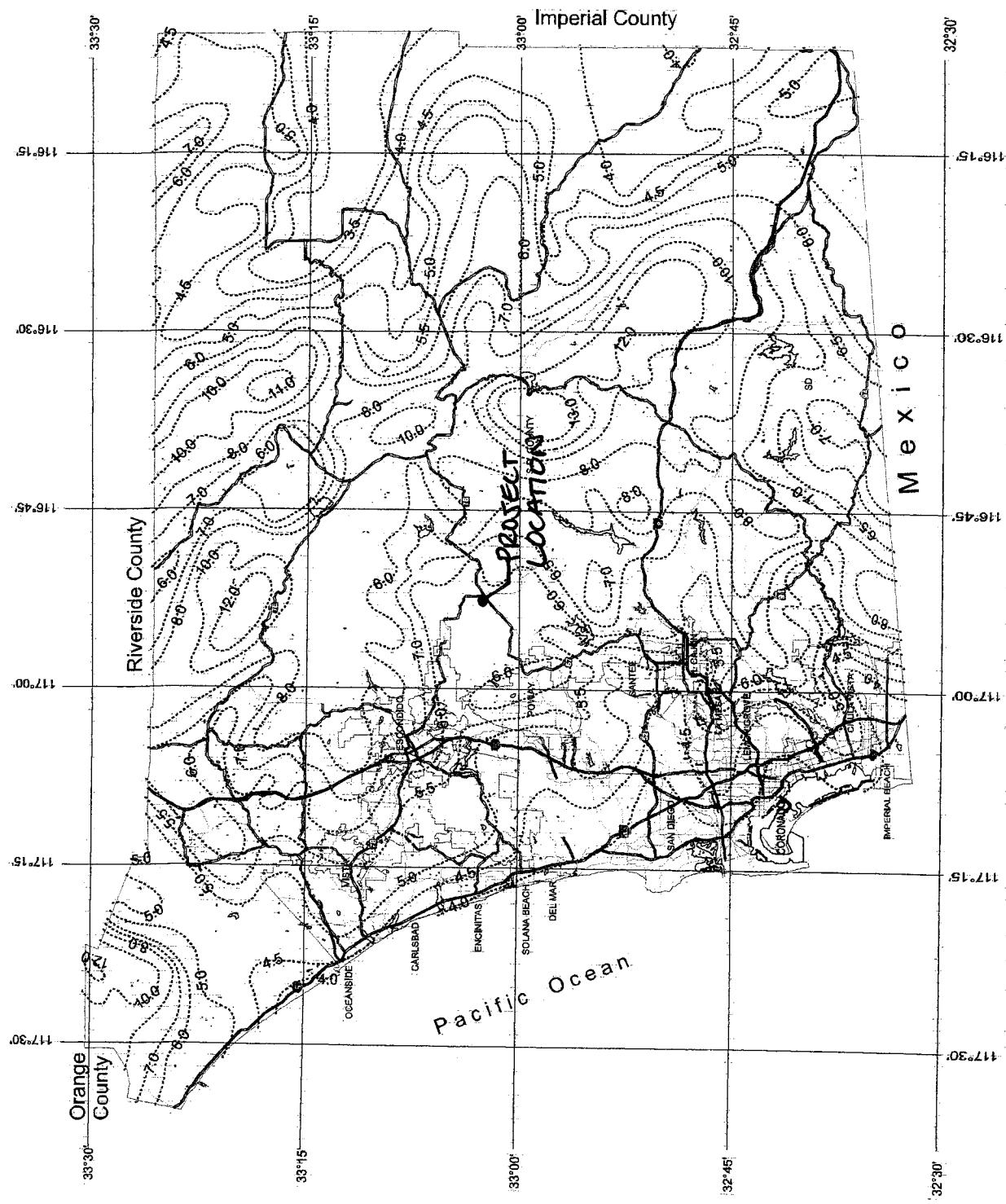
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Thomas Battin Maps

3 Miles



3 Miles



# County of San Diego Hydrology Manual



Rainfall Isopluvials

100 Year Rainfall Event - 6 Hours

3.5 inch/hr



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DPPW  
GIS

Department of Public Works  
Geospatial Information System

City of San Diego

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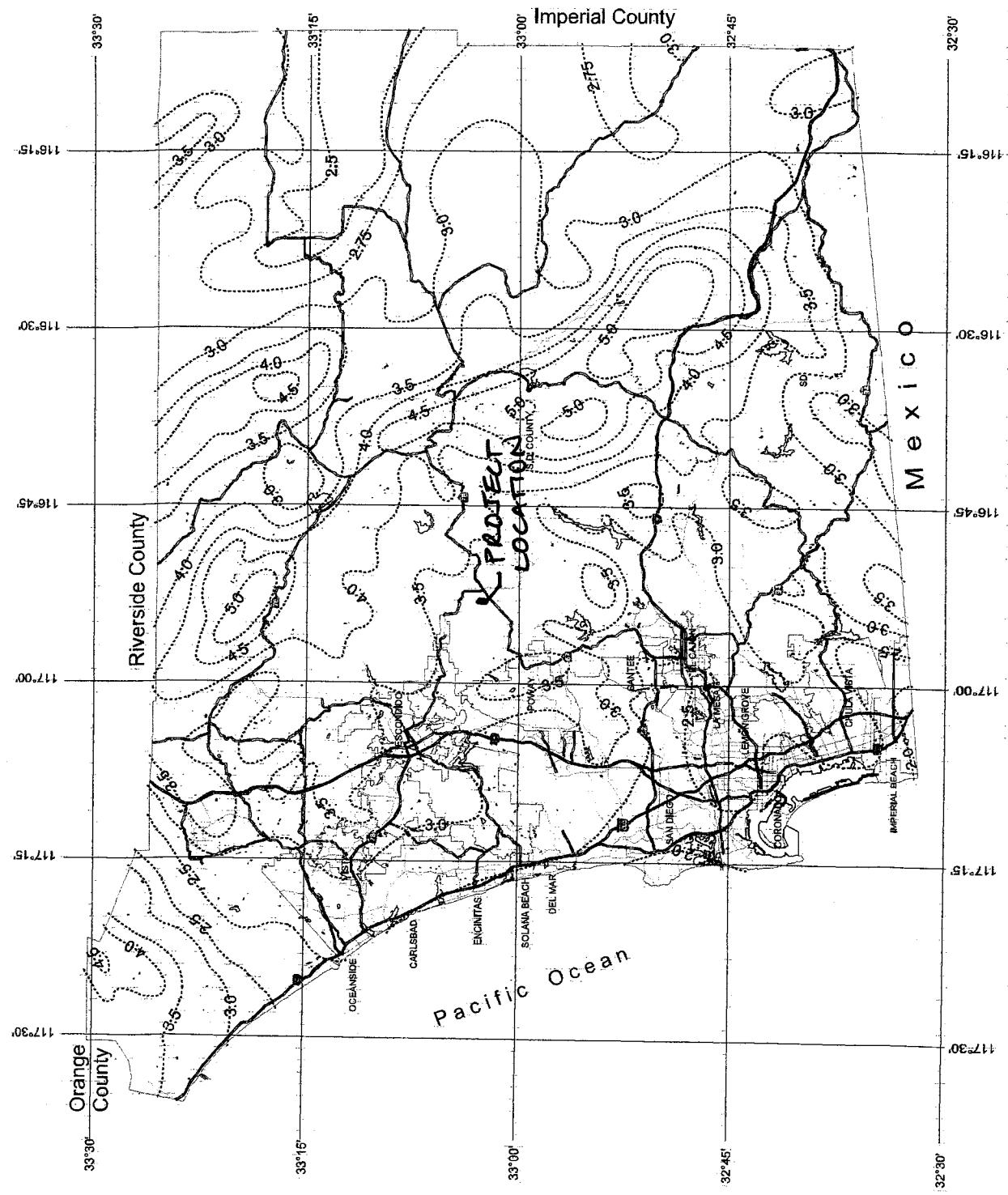
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3 Miles

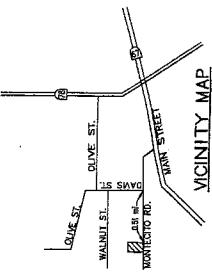


3 Miles



APPLICANT NAME  
ANDREW T. AND MELISSA GIFFEL  
HUSBAND AND WIFE OF  
2248 MONTECITO ROAD  
RANCHO MIRADA, CA 92365  
703-754-3534

ENGINEERS NAME  
RICHARD S. TOLINSON JR.  
915 CERANET MESA BLVD  
SUITE 100  
SAN DIEGO, CA 92124  
619-514-3530



VICINITY MAP

GRAPHIC SCALE  
SCALE: 1"=20'

SEE EXHIBIT C FOR OFFSITE BASIN

APN 281-540-33

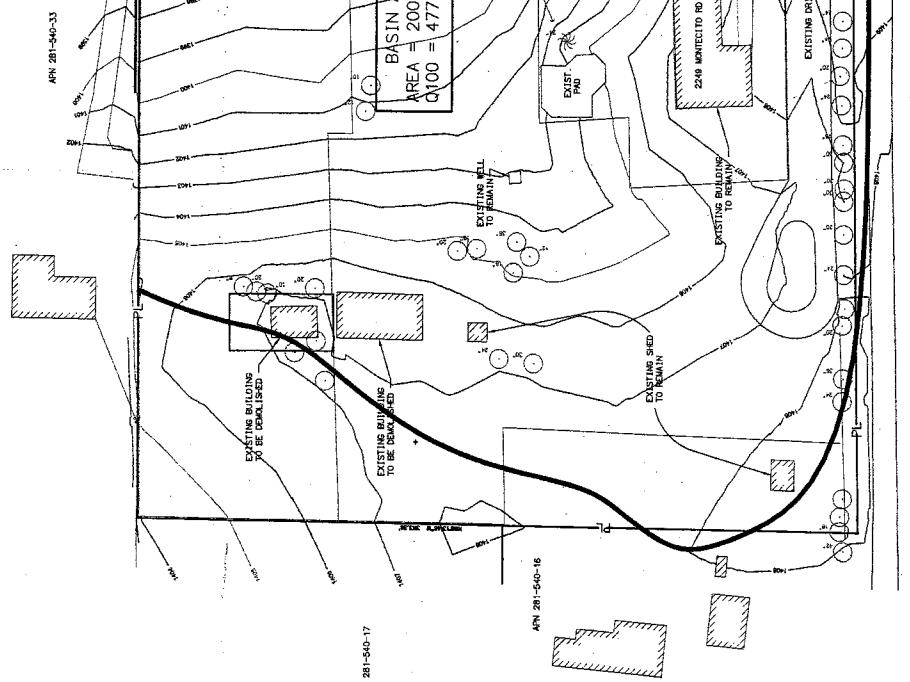


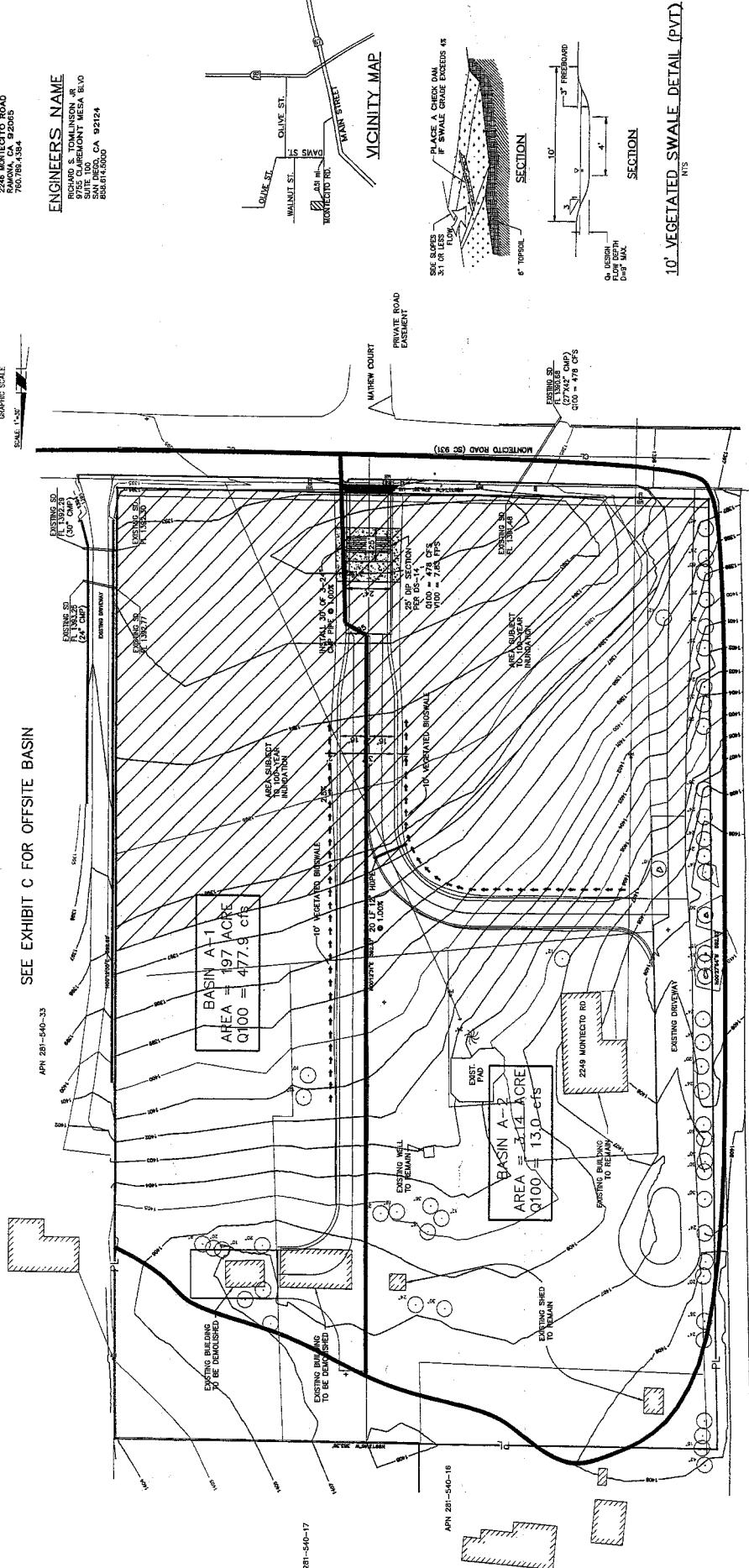
EXHIBIT A  
HYDROLOGY EXHIBIT  
EXISTING CONDITION

APPLICANT NAME  
ANDREW W. GIFFEN AND MELESA A. GIFFEN  
AS COMMUNITY PROPERTY  
2248 MONTECITO ROAD  
MENLO PARK, CA 94025  
703-413-5454

ENGINEERS NAME  
JOHN S. DUNNINGTON, JR.  
9755 S. RIMERICHALES ESTATES  
SUITE 100  
SAN DIEGO, CA 92124  
619-451-1500

GRAPHIC SCALE  
SCALE 1"=50'

SEE EXHIBIT C FOR OFFSITE BASIN



10' VEGETATED SWALE DETAIL (PVT.)

EXHIBIT B  
HYDROLOGY EXHIBIT  
PROPOSED CONDITION

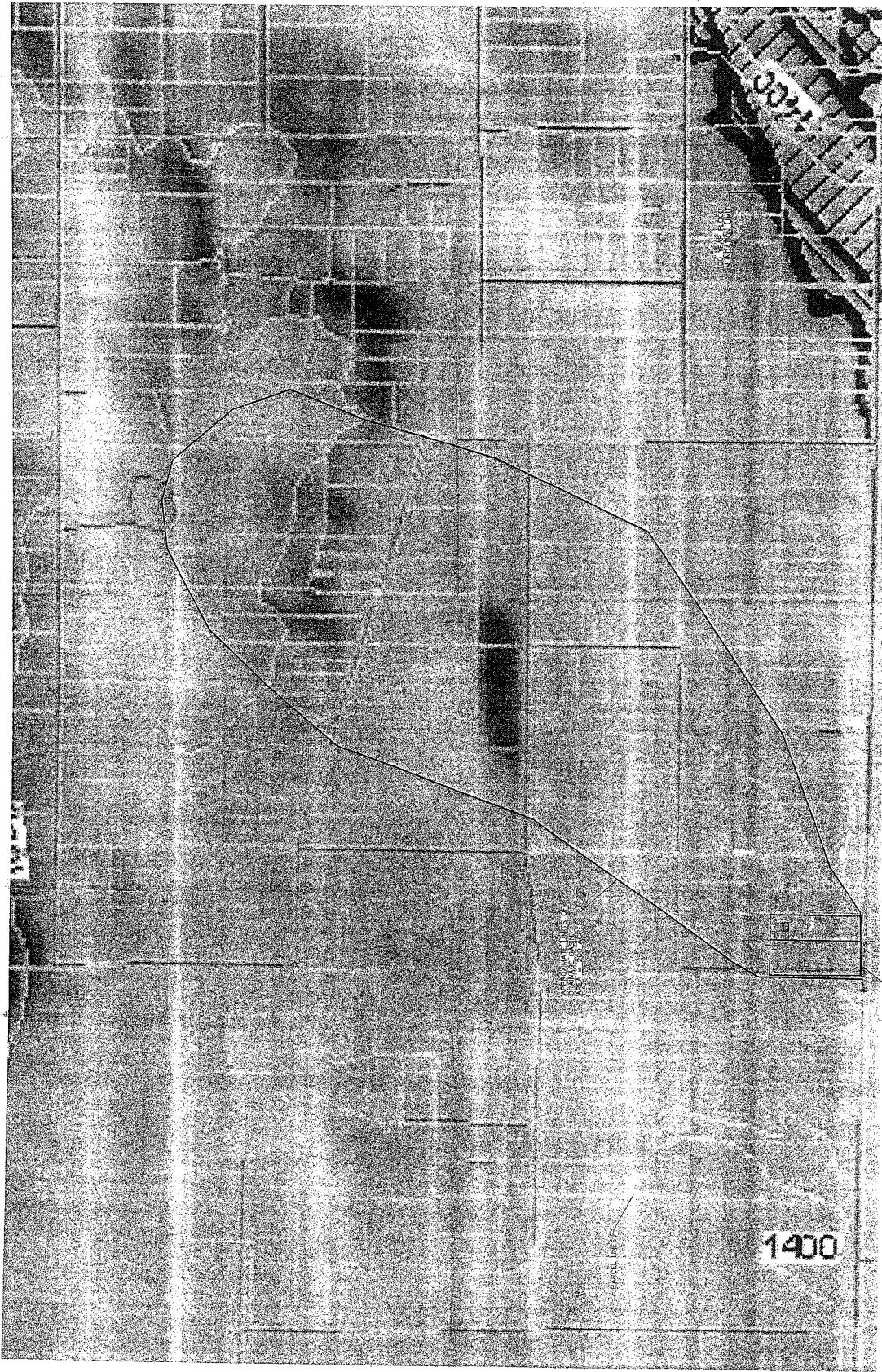


EXHIBIT C  
HYDROLOGY EXHIBIT  
**RBF** CONSULTING

TPM 20826; Log Number 04-09-008